

Appl. No. 10/064,589
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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (currently amended) A magnetic field shimming system for an MRI magnetic field generating assembly, the magnetic field shimming system comprising:
a plurality of shims secured relative to a surface of the magnetic field generating assembly to at least partially correct inhomogeneities in a magnetic field generated by the magnetic field generating assembly, said plurality of shims being arranged along a plurality of concentric geometric shapes;

wherein said plurality of shims arranged along a geometric shape of said plurality of concentric geometric shapes includes a first shim having a first amount of material and a second shim having a second different amount of material;

wherein said plurality of shims each have a top edge and a bottom edge separated by a distance h and a center defined by the distance $h/2$ between said top edge and said bottom edge; and

wherein said plurality of centers are allowed to be non-planar.

2. (original) The magnetic field shimming system of claim 1, wherein at least one shim in said plurality of shims is directly coupled to said surface.

3. (original) The magnetic field shimming system of claim 1, wherein said plurality of shims are secured relative to said surface by a shim holder.

4. (canceled)

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5. (original) The magnetic field shimming system of claim 1, wherein at least two shims in said plurality of shims are coupled together in a group, each shim in said at least two shims comprises a flat plate of magnetic material including a top edge, a bottom edge, side edges, and face surfaces, said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with a direction of the magnetic field generated by the magnetic field generating assembly.

6. (currently amended) A magnetic field shimming system for an MRI magnetic field generating assembly, the magnetic field shimming system comprising:

a first plurality of shims secured relative to a surface of the magnetic field generating assembly to at least partially correct inhomogeneities in a magnetic field generated by the magnetic field generating assembly, said first plurality of shims being arranged in a series of columns extending along said surface ; and

a second plurality of shims secured relative to said surface to at least partially correct said inhomogeneities in said magnetic field generated by the magnetic field generating assembly, said second plurality of shims being arranged in a series of rows extending along said surface, said rows being normal to said columns;

wherein said first or said second plurality of shims includes a first shim having a first amount of material and a second shim having a second different amount of material;

wherein said first and second plurality of shims each have a top edge and a bottom edge separated by a distance h and a center defined by the distance $h/2$ between said top edge and said bottom edge; and

wherein said plurality of centers are allowed to be non-planar.

7. (original) The magnetic field shimming system of claim 6, wherein at least one shim is directly coupled to said surface.

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8. (original) The magnetic field shimming system of claim 6, wherein said first and second pluralities of shims are secured relative to said surface by a shim holder.

9. (original) The magnetic field shimming system of claim 6, wherein at least one shim is a flat plate including a top edge, a bottom edge, side edges, and face surfaces, and wherein said at least one shim is arranged such that said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with a direction of the magnetic field generated by the magnetic field generating assembly.

10. (original) The magnetic field shimming system of claim 6, wherein at least two shims are coupled together in a group, each shim in said at least two shims comprises a flat plate including a top edge, a bottom edge, side edges, and face surfaces, said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with a direction of the magnetic field generated by the magnetic field generating assembly.

11. (canceled)

12. (currently amended) A method for shimming an MRI magnetic field generating assembly, the method comprising:

arranging a plurality of shims in a pattern, said pattern being formed in a plane extending along a surface of the MRI magnetic field generating assembly, said pattern including a plurality of concentric geometric shapes, said plurality of shims each have a top edge and a bottom edge separated by a distance h and a center defined by the distance h/2 between the top edge and the bottom edge, said plurality of shims arranged along a geometric shape of said plurality of concentric geometric shapes including a first shim

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having a first amount of material and a second shim having a second different amount of material, said arranging allowing said plurality of centers to be non-planar;

wherein at least one shim in said plurality of shims is a flat plate of magnetic material including a top edge, a bottom edge, side edges, and face surfaces, and wherein said arranging further includes:

positioning said at least one shim such that said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with a direction of a magnetic field generated by the magnetic field generating assembly.

13. (original) The method of claim 12, further comprising:

selecting a height of said at least one shim to at least partially correct inhomogeneities in the magnetic field generated by said magnetic field generating assembly, said height being a distance between said top edge and said bottom edge.

14. (original) The method of claim 13, further comprising:

selecting a width of said at least one shim to at least partially correct inhomogeneities in the magnetic field generated by said magnetic field generating assembly, said width being a distance between said side edges.

15. (original) The method of claim 12, wherein at least two shims in said plurality of shims each comprise a flat plate of magnetic material including a top edge, a bottom edge, side edges, and face surfaces, and wherein said arranging further includes:

coupling said at least two shims; and

positioning said at least two shims such that said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with the direction of the magnetic field generated by the magnetic field generating assembly.

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16. (currently amended) A method for shimming an MRI magnetic field generating assembly, the method comprising:

- arranging a first plurality of shims in a plurality of columns extending along a surface of the MRI magnetic field generating assembly; and
- arranging a second a plurality of shims in a plurality of rows extending along said surface, said plurality of rows being normal to said plurality of columns;
- wherein said first or said second plurality of shims include a first shim having a first amount of material and a second shim having a second different amount of material;
- wherein said first and second plurality of shims each have a top edge and a bottom edge separated by a distance h and a center defined by the distance h/2 between said top edge and said bottom edge; and
- wherein said arranging allows said plurality of centers to be non-planar.

17. (original) The method of claim 16, wherein at least one shim is a flat plate of magnetic material including a top edge, a bottom edge, side edges, and face surfaces, and wherein said arranging further includes:

- positioning said at least one shim such that said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with a direction of a magnetic field generated by the magnetic field generating assembly.

18. (original) The method of claim 17, further comprising:

- selecting a height of said at least one shim to at least partially correct inhomogeneities in the magnetic field generated by said magnetic field generating assembly, said height being a distance between said top edge and said bottom edge.

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19. (original) The method of claim 18, further comprising:
selecting a width of said at least one shim to at least partially correct inhomogeneities in the magnetic field generated by said magnetic field generating assembly, said width being a distance between said side edges.

20. (original) The method of claim 16, wherein at least two shims each comprise a flat plate of magnetic material including a top edge, a bottom edge, side edges, and face surfaces, and wherein said arranging further includes:

coupling said at least two shims; and
positioning said at least two shims such that said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with a direction of the magnetic field generated by the magnetic field generating assembly.

21. (currently amended) An MRI magnet assembly comprising:
a magnetic field generating assembly; and
a plurality of shims secured relative to a surface of said magnetic field generating assembly for at least partially correcting inhomogeneities in a magnetic field generated by said magnetic field generating assembly, at least one magnetic material shim in said plurality of magnetic material shims is a flat plate of magnetic material including a top edge, a bottom edge, side edges, and face surfaces, and said at least one shim is arranged such that said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with a direction of the magnetic field generated by said magnetic field generating assembly;

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wherein said plurality of shims includes a first shim having a first amount of material and a second shim having a second different amount of material;

wherein said plurality of shims each have a top edge and a bottom edge separated by a distance h and a center defined by the distance $h/2$ between said top edge and said bottom edge, said plurality of centers being allowed to be non-planar.

22. (original) The MRI magnet assembly of claim 21, wherein said plurality of magnetic material shims are arranged along a plurality of concentric geometric shapes each having at least five sides.

23. (original) The MRI magnet assembly of claim 21, wherein said plurality of magnetic material shims are arranged in a rows and columns.

24. (original) The MRI magnet assembly of claim 21, wherein said at least one shim is secured relative to said surface by a shim holder, said shim holder including a holder disk having a slot disposed therein, said slot receiving said at least one shim.

25. (original) The MRI magnet assembly of claim 24, wherein said shim holder further includes a cover disk to secure said shim within said slot of said holder disk.

26. (original) The MRI magnet assembly of claim 24, wherein said at least one shim is secured directly to said surface.

27. (currently amended) A magnetic field shimming system for an MRI magnetic field generating assembly, the magnetic field shimming system comprising:
a plurality of shims secured relative to a surface of the magnetic field generating assembly to at least partially correct inhomogeneities in a magnetic field generated by the magnetic field generating assembly, said plurality of shims being arranged along a plurality of concentric geometric shapes each having at least five sides;

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wherein at least one shim in said plurality of shims is a flat plate of magnetic material, said flat plate including a top edge, a bottom edge, side edges, and face surfaces, and wherein said at least one shim is arranged such that said bottom edge is a proximal portion of said flat plate relative to said surface, said top edge is a distal portion of said flat plate relative to said surface, and said face surfaces are aligned with a direction of the magnetic field generated by the magnetic field generating assembly;

wherein said plurality of shims arranged along a geometric shape of said plurality of concentric geometric shapes includes a first shim having a first amount of material and a second shim having a second different amount of material;

wherein said plurality of shims each have a top edge and a bottom edge separated by a distance h and a center defined by the distance $h/2$ between said top edge and said bottom edge, said plurality of centers being allowed to be non-planar.

28. (canceled)

29. (previously presented) The magnetic field shimming system of Claim 31, wherein:

each of said plurality of shims have a shape other than the shape of said plurality of concentric geometric shapes.

30. (previously presented) The magnetic field shimming system of Claim 31, wherein:

said plurality of shims arranged along one of said plurality of concentric geometric shapes includes a permanent magnet, a magnetic material other than a permanent magnetic, or any combination comprising at least one each of the foregoing materials.

31. (currently amended) A magnetic field shimming system for an MRI magnetic field generating assembly, the magnetic field shimming system comprising:

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a plurality of shims secured relative to a surface of the magnetic field generating assembly to at least partially correct inhomogeneities in a magnetic field generated by the magnetic field generating assembly, said plurality of shims arranged along a plurality of concentric geometric shapes adapted to receive more than one of said plurality of shims;

wherein said plurality of shims arranged along a geometric shape of said plurality of concentric geometric shapes includes a first shim having a first amount of material and a second shim having a second different amount of material;

wherein said plurality of shims each have a top edge and a bottom edge separated by a distance h and a center defined by the distance $h/2$ between said top edge and said bottom edge; and

wherein said plurality of centers are allowed to be non-planar.

32. (new) The magnetic field shimming system of Claim 5, wherein:
said top edge has a surface area smaller than said face surfaces.

33. (new) The magnetic field shimming system of Claim 9, wherein:
said top edge has a surface area smaller than said face surfaces.

34. (new) The magnetic field shimming system of Claim 27, wherein:
said top edge has a surface area smaller than said face surfaces.